Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	12/22/2015 10:42:29 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
er of Bootstrap Operations	2000

Arsenic

General Statistics

Total Number of Observations	25	Number of Distinct Observations	25
Number of Detects	24	Number of Non-Detects	1
Number of Distinct Detects	24	Number of Distinct Non-Detects	1
Minimum Detect	8.7	Minimum Non-Detect	2.3
Maximum Detect	190	Maximum Non-Detect	2.3
Variance Detects	3139	Percent Non-Detects	4%
Mean Detects	54.46	SD Detects	56.03
Median Detects	25.4	CV Detects	1.029
Skewness Detects	1.272	Kurtosis Detects	0.471
Mean of Logged Detects	3.503	SD of Logged Detects	1.011

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.779	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.291	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.181	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	52.37	Standard Error of Mean	11.18
SD	54.71	95% KM (BCA) UCL	71.68
95% KM (t) UCL	71.49	95% KM (Percentile Bootstrap) UCL	71.09
95% KM (z) UCL	70.76	95% KM Bootstrap t UCL	75.67
90% KM Chebyshev UCL	85.9	95% KM Chebyshev UCL	101.1
97.5% KM Chebyshev UCL	122.2	99% KM Chebyshev UCL	163.6

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.218	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.769	ected Data Not Gamma Distributed at 5% Significance L	
K-S Test Statistic	0.196	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.182	ected Data Not Gamma Distributed at 5% Significance L	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.148	k star (bias corrected MLE)	1.033
Theta hat (MLE)	47.42	Theta star (bias corrected MLE)	52.74
nu hat (MLE)	55.12	nu star (bias corrected)	49.57
MLE Mean (bias corrected)	54.46	MLE Sd (bias corrected)	53.59

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.917	nu hat (KM)	45.83
Approximate Chi Square Value (45.83, α)	31.3	Adjusted Chi Square Value (45.83, β)	30.48
mma Approximate KM-UCL (use when n>=50)	76.69	% Gamma Adjusted KM-UCL (use when n<50)	78.75

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
or gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate

Minimum	0.01	Mean	52.28
Maximum	190	Median	24
SD	55.92	CV	1.07
k hat (MLE)	0.767	k star (bias corrected MLE)	0.701
Theta hat (MLE)	68.18	Theta star (bias corrected MLE)	74.53
nu hat (MLE)	38.34	nu star (bias corrected)	35.07
MLE Mean (bias corrected)	52.28	MLE Sd (bias corrected)	62.42
		Adjusted Level of Significance (β)	0.039
Approximate Chi Square Value (35.07, α)	22.52	Adjusted Chi Square Value (35.07, β)	21.84
Gamma Approximate UCL (use when n>=50)	81.41	95% Gamma Adjusted UCL (use when n<50)	83.97

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.135	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.181	Detected Data appear Lognormal at 5% Significance Leve

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	52.39	Mean in Log Scale	3.403
SD in Original Scale	55.82	SD in Log Scale	1.107
95% t UCL (assumes normality of ROS data)	71.49	95% Percentile Bootstrap UCL	71.28
95% BCA Bootstrap UCL	73.93	95% Bootstrap t UCL	75.69
95% H-UCL (Log ROS)	100.6		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	3.396	95% H-UCL (KM -Log)	98.79
KM SD (logged)	1.101	95% Critical H Value (KM-Log)	2.627
KM Standard Error of Mean (logged)	0.225		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	52.33	Mean in Log Scale	3.368
SD in Original Scale	55.88	SD in Log Scale	1.196
95% t UCL (Assumes normality)	71.45	95% H-Stat UCL	116.3

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL	122.2

Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
Recommendations are based upon data size, data distribution, and skewness.
recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2
, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a st

Benzo(a)anthracene

General Statistics

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Total Number of Observations	4	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	2
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.18	Minimum Non-Detect	0.04
Maximum Detect	0.56	Maximum Non-Detect	0.38
Variance Detects	0.072	Percent Non-Detects	50%
Mean Detects	0.37	SD Detects	0.269
Median Detects	0.37	CV Detects	0.726
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.147	SD of Logged Detects	0.803

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.223	Standard Error of Mean	0.147
SD	0.204	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.569	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.465	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.665	95% KM Chebyshev UCL	0.865
97.5% KM Chebyshev UCL	1.143	99% KM Chebyshev UCL	1.69

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.424	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.108	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	13.7	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	1.189	nu hat (KM)	9.51
		Adjusted Level of Significance (β)	0.0049
Approximate Chi Square Value (9.51, α)	3.638	Adjusted Chi Square Value (9.51, β)	1.949
mma Approximate KM-UCL (use when n>=50)	0.582	% Gamma Adjusted KM-UCL (use when n<50)	1.085

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.225	Mean in Log Scale	-1.865
SD in Original Scale	0.229	SD in Log Scale	0.986
95% t UCL (assumes normality of ROS data)	0.495	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	10.69		

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.238	Mean in Log Scale	-1.967
SD in Original Scale	0.229	SD in Log Scale	1.398
95% t UCL (Assumes normality)	0.507	95% H-Stat UCL	633.4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.569	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!
Warning: Recommended UCL exceeds the maximum observation

Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
Recommendations are based upon data size, data distribution, and skewness.
recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2
, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a sta

Benzo(a)pyrene

General Statistics

Total Number of Observations	4	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	2
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.16	Minimum Non-Detect	0.04
Maximum Detect	0.44	Maximum Non-Detect	0.38
Variance Detects	0.039	Percent Non-Detects	50%
Mean Detects	0.3	SD Detects	0.198
Median Detects	0.3	CV Detects	0.66
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.327	SD of Logged Detects	0.715

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.185	Standard Error of Mean	0.113
SD	0.156	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.452	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.372	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.525	95% KM Chebyshev UCL	0.679
97.5% KM Chebyshev UCL	0.893	99% KM Chebyshev UCL	1.313

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Gamma Statistics on Detected Data Only

k hat (MLE)	4.231	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.070	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	16.92	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	1.404	nu hat (KM)	11.23
		Adjusted Level of Significance (β)	0.004
Approximate Chi Square Value (11.23, α)	4.726	Adjusted Chi Square Value (11.23, β)	2.712
mma Approximate KM-UCL (use when n>=50)	0.44	% Gamma Adjusted KM-UCL (use when n<50)	0.766

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.188	Mean in Log Scale	-1.967
SD in Original Scale	0.173	SD in Log Scale	0.879
95% t UCL (assumes normality of ROS data)	0.392	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	4.126		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.203	Mean in Log Scale	-2.057
SD in Original Scale	0.175	SD in Log Scale	1.314
95% t UCL (Assumes normality)	0.408	95% H-Stat UCL	217.8

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.452	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!
Warning: Recommended UCL exceeds the maximum observation

uggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
Recommendations are based upon data size, data distribution, and skewness.
recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2
, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a st

Benzo(b)fluoranthene

General Statistics

Total Number of Observations	4	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	2
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.25	Minimum Non-Detect	0.04
Maximum Detect	0.74	Maximum Non-Detect	0.38
Variance Detects	0.12	Percent Non-Detects	50%
Mean Detects	0.495	SD Detects	0.346
Median Detects	0.495	CV Detects	0.7
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-0.844	SD of Logged Detects	0.767

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.294	Standard Error of Mean	0.198
SD	0.273	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.761	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.62	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.889	95% KM Chebyshev UCL	1.159
97.5% KM Chebyshev UCL	1.533	99% KM Chebyshev UCL	2.269

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.717	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.133	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	14.87	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	1.156	nu hat (KM)	9.248
		Adjusted Level of Significance (β)	0.0049
Approximate Chi Square Value (9.25, α)	3.477	Adjusted Chi Square Value (9.25, β)	1.84
mma Approximate KM-UCL (use when n>=50)	0.781	% Gamma Adjusted KM-UCL (use when n<50)	1.476

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.305	Mean in Log Scale	-1.53
SD in Original Scale	0.299	SD in Log Scale	0.943
95% t UCL (assumes normality of ROS data)	0.656	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	10.48		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.3	Mean in Log Scale	-1.815
SD in Original Scale	0.309	SD in Log Scale	1.516
95% t UCL (Assumes normality)	0.664	95% H-Stat UCL	3197

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Suggested UCL to Use

95% KM (t) UCL	0.761	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!
Warning: Recommended UCL exceeds the maximum observation

Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
Recommendations are based upon data size, data distribution, and skewness.
recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2
, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a st

Benzo(k)fluoranthene

General Statistics

Total Number of Observations	4	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	2
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.085	Minimum Non-Detect	0.04
Maximum Detect	0.28	Maximum Non-Detect	0.38
Variance Detects	0.019	Percent Non-Detects	50%
Mean Detects	0.183	SD Detects	0.138
Median Detects	0.183	CV Detects	0.756
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.869	SD of Logged Detects	0.843

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.135	Standard Error of Mean	0.085
SD	0.104	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.335	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.275	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.39	95% KM Chebyshev UCL	0.506
97.5% KM Chebyshev UCL	0.666	99% KM Chebyshev UCL	0.981

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.132	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.058	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	12.53	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	1.68	nu hat (KM)	13.44
		Adjusted Level of Significance (β)	0.0049

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Approximate Chi Square Value (13.44, α)	6.188	Adjusted Chi Square Value (13.44, β)	3.786
mma Approximate KM-UCL (use when n>=50)	0.293	% Gamma Adjusted KM-UCL (use when n<50)	0.479

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.11	Mean in Log Scale	-2.762
SD in Original Scale	0.118	SD in Log Scale	1.366
95% t UCL (assumes normality of ROS data)	0.248	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	196.4		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.144	Mean in Log Scale	-2.328
SD in Original Scale	0.115	SD in Log Scale	1.167
95% t UCL (Assumes normality)	0.279	95% H-Stat UCL	35.3

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.335	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!
Warning: Recommended UCL exceeds the maximum observation

Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
Recommendations are based upon data size, data distribution, and skewness.
recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2
, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a st

Cadmium

General Statistics

Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	1.5	Mean	51.51
Maximum	286	Median	34.7
SD	60.74	Std. Error of Mean	12.15
Coefficient of Variation	1.179	Skewness	2.712

Normal GOF Test

Shapiro Wilk Test Statistic	0.703	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	72.29	95% Adjusted-CLT UCL (Chen-1995)	78.53
		95% Modified-t UCL (Johnson-1978)	73.39

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Gamma GOF Test

A-D Test Statistic	0.339	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.773	cted data appear Gamma Distributed at 5% Significance
K-S Test Statistic	0.135	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.18	cted data appear Gamma Distributed at 5% Significance

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.001	k star (bias corrected MLE)	0.907
Theta hat (MLE)	51.47	Theta star (bias corrected MLE)	56.77
nu hat (MLE)	50.04	nu star (bias corrected)	45.37
MLE Mean (bias corrected)	51.51	MLE Sd (bias corrected)	54.07
		Approximate Chi Square Value (0.05)	30.91
Adjusted Level of Significance	0.039	Adjusted Chi Square Value	30.1

Assuming Gamma Distribution

› Approximate Gamma UCL (use when n>=50)	75.58	95% Adjusted Gamma UCL (use when n<50)	77.63

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.143	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.405	Mean of logged Data	3.365
Maximum of Logged Data	5.656	SD of logged Data	1.22

Assuming Lognormal Distribution

95% H-UCL	121.8	90% Chebyshev (MVUE) UCL	108.2
95% Chebyshev (MVUE) UCL	130.9	97.5% Chebyshev (MVUE) UCL	162.4
99% Chebyshev (MVUE) UCL	224.3		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	71.49	95% Jackknife UCL	72.29
95% Standard Bootstrap UCL	71.57	95% Bootstrap-t UCL	87.71
95% Hall's Bootstrap UCL	154.3	95% Percentile Bootstrap UCL	73.38
95% BCA Bootstrap UCL	78.23		
90% Chebyshev(Mean, Sd) UCL	87.95	95% Chebyshev(Mean, Sd) UCL	104.5
97.5% Chebyshev(Mean, Sd) UCL	127.4	99% Chebyshev(Mean, Sd) UCL	172.4

Suggested UCL to Use

95% Adjusted Gamma UCL	77.63

Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
se recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Chrysene

General Statistics

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Total Number of Observations	4	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	2
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.26	Minimum Non-Detect	0.04
Maximum Detect	0.68	Maximum Non-Detect	0.38
Variance Detects	0.088	Percent Non-Detects	50%
Mean Detects	0.47	SD Detects	0.297
Median Detects	0.47	CV Detects	0.632
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-0.866	SD of Logged Detects	0.68

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.283	Standard Error of Mean	0.182
SD	0.248	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.711	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.582	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.829	95% KM Chebyshev UCL	1.076
97.5% KM Chebyshev UCL	1.419	99% KM Chebyshev UCL	2.094

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	4.651	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.101	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	18.6	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	1.293	nu hat (KM)	10.34
		Adjusted Level of Significance (β)	0.0049
Approximate Chi Square Value (10.34, α)	4.156	Adjusted Chi Square Value (10.34, β)	2.308
mma Approximate KM-UCL (use when n>=50)	0.703	% Gamma Adjusted KM-UCL (use when n<50)	1.266

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.3	Mean in Log Scale	-1.475
SD in Original Scale	0.262	SD in Log Scale	0.835
95% t UCL (assumes normality of ROS data)	0.609	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	4.913		

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.288	Mean in Log Scale	-1.826
SD in Original Scale	0.28	SD in Log Scale	1.493
95% t UCL (Assumes normality)	0.617	95% H-Stat UCL	2331

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.711	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!
Warning: Recommended UCL exceeds the maximum observation

Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
Recommendations are based upon data size, data distribution, and skewness.
recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (
, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a st

Indeno(1,2,3-cd)pyrene

General Statistics

Total Number of Observations	3	Number of Distinct Observations	3
Number of Detects	1	Number of Non-Detects	2
Number of Distinct Detects	1	Number of Distinct Non-Detects	2

g: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a da
o use alternative site specific values determined by the Project Team to estimate environmental parameters (e

The data set for variable Indeno(1,2,3-cd)pyrene was not processed!

Lead

General Statistics

Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	11	Mean	2187
Maximum	13000	Median	743.5
SD	3034	Std. Error of Mean	606.8
Coefficient of Variation	1.388	Skewness	2.185

Normal GOF Test

Shapiro Wilk Test Statistic	0.724	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.26	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	3225	95% Adjusted-CLT UCL (Chen-1995)	3468
		95% Modified-t UCL (Johnson-1978)	3269

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Gamma GOF Test

A-D Test Statistic	0.378	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.804	cted data appear Gamma Distributed at 5% Significance
K-S Test Statistic	0.126	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.184	cted data appear Gamma Distributed at 5% Significance

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.536	k star (bias corrected MLE)	0.499
Theta hat (MLE)	4076	Theta star (bias corrected MLE)	4384
nu hat (MLE)	26.82	nu star (bias corrected)	24.94
MLE Mean (bias corrected)	2187	MLE Sd (bias corrected)	3096
		Approximate Chi Square Value (0.05)	14.56
Adjusted Level of Significance	0.039	Adjusted Chi Square Value	14.02

Assuming Gamma Distribution

› Approximate Gamma UCL (use when n>=50)	3744	95% Adjusted Gamma UCL (use when n<50)	3888

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.11	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.398	Mean of logged Data	6.519
Maximum of Logged Data	9.473	SD of logged Data	1.868

Assuming Lognormal Distribution

95% H-UCL	16318	90% Chebyshev (MVUE) UCL	8039
95% Chebyshev (MVUE) UCL	10188	97.5% Chebyshev (MVUE) UCL	13170
99% Chebyshev (MVUE) UCL	19028		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	3185	95% Jackknife UCL	3225
95% Standard Bootstrap UCL	3167	95% Bootstrap-t UCL	3768
95% Hall's Bootstrap UCL	4082	95% Percentile Bootstrap UCL	3231
95% BCA Bootstrap UCL	3495		
90% Chebyshev(Mean, Sd) UCL	4007	95% Chebyshev(Mean, Sd) UCL	4832
97.5% Chebyshev(Mean, Sd) UCL	5976	99% Chebyshev(Mean, Sd) UCL	8225

Suggested UCL to Use

95% Adjusted Gamma UCL	3888

Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
se recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Manganese

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

General Statistics

Total Number of Observations	25	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	391	Mean	3007
Maximum	37550	Median	1050
SD	7338	Std. Error of Mean	1468
Coefficient of Variation	2.441	Skewness	4.707

Normal GOF Test

Shapiro Wilk Test Statistic	0.347	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.361	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5517	95% Adjusted-CLT UCL (Chen-1995)	6897
		95% Modified-t UCL (Johnson-1978)	5748

Gamma GOF Test

A-D Test Statistic	2.574	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.787	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.228	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.182	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.718	k star (bias corrected MLE)	0.658
Theta hat (MLE)	4190	Theta star (bias corrected MLE)	4569
nu hat (MLE)	35.88	nu star (bias corrected)	32.91
MLE Mean (bias corrected)	3007	MLE Sd (bias corrected)	3706
		Approximate Chi Square Value (0.05)	20.79
Adjusted Level of Significance	0.039	Adjusted Chi Square Value	20.13

Assuming Gamma Distribution

Approximate Gamma UCL (use when n>=50))	4758	95% Adjusted Gamma UCL (use when n<50)	4914

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.159	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.969	Mean of logged Data	7.169
Maximum of Logged Data	10.53	SD of logged Data	1.044

Assuming Lognormal Distribution

95% H-UCL	3857	90% Chebyshev (MVUE) UCL	3726
95% Chebyshev (MVUE) UCL	4431	97.5% Chebyshev (MVUE) UCL	5409
99% Chebyshev (MVUE) UCL	7331		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Table E-9:
ProUCL Output for UPSEA Area Samples (0-3 feet bgs)
OU3 Human Health Risk Evaluation
DePue Site, DePue, IL

Nonparametric Distribution Free UCLs

95% CLT UCL	5421	95% Jackknife UCL	5517
95% Standard Bootstrap UCL	5449	95% Bootstrap-t UCL	14781
95% Hall's Bootstrap UCL	14152	95% Percentile Bootstrap UCL	5887
95% BCA Bootstrap UCL	7449		
90% Chebyshev(Mean, Sd) UCL	7409	95% Chebyshev(Mean, Sd) UCL	9403
97.5% Chebyshev(Mean, Sd) UCL	12171	99% Chebyshev(Mean, Sd) UCL	17608

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	9403

Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95
se recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.